

SEQUENCE LISTING

<110> Universiteit Utrecht Holding B.V.
 <120> Piroplasmid vaccine
 <130> 2003-010
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 <170> PatentIn version 3.2
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 Phe Ala Glu Asp Ala Leu Ala Ser Asn Ser Thr Leu Phe Ala Phe His
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 Trp Ile Lys Tyr Met Gln Lys Phe Asp Ile Pro Arg Asn His Gly Ser
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 Gly Ile Tyr Val Asp Leu Gly Gly Tyr Glu Ser Val Gly Ser Lys Ser
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 tat cgt atg ccc gtt ggt aag tgc cca gta gtc ggt aaa att ata gac 432
 Tyr Arg Met Pro Val Gly Lys Cys Pro Val Val Gly Lys Ile Ile Asp
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225		230		235
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245		250		255
aat agg tat tgt gac aac gat ggt agc tcc gaa gat ggt aca agc tct Asn Arg Tyr Cys Asp Asn Asp Gly Ser Ser Glu Asp Gly Thr Ser Ser				816
260		265		270
ttg ctt tgc atg aaa cct tac aag agc gct gag gat gca cac tta tac Leu Leu Cys Met Lys Pro Tyr Lys Ser Ala Glu Asp Ala His Leu Tyr				864
275		280		285
tac ggt tct gcg aaa gtt gac ccc gat tgg gaa gaa aat tgt ccc atg Tyr Gly Ser Ala Lys Val Asp Pro Asp Trp Glu Glu Asn Cys Pro Met				912
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Lys Glu Pro Asn Asn Arg Arg Leu Thr Lys Arg Ser Ser Arg Gly Gln
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Leu Leu Asn Ser Arg Arg Gly Ser Asp Asp Ala Ser Glu Ser Ser Asp
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Trp Ile Lys Tyr Met Gln Lys Phe Asp Ile Pro Arg Asn His Gly Ser
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Gly Ile Tyr Val Asp Leu Gly Gly Tyr Glu Ser Val Gly Ser Lys Ser
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Leu Ser Pro Val Ser Ala Lys Asp Leu Arg Arg Trp Gly Tyr Glu Gly
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Asn Asp Val Ala Asn Cys Ser Glu Tyr Ala Ser Asn Leu Ile Pro Ala
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Leu Leu Cys Met Lys Pro Tyr Lys Ser Ala Glu Asp Ala His Leu Tyr
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His Pro Val Arg Asp Ala Ile Phe Gly Lys Trp Ser Gly Gly Ser Cys
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Val Ala Ile Ala Pro Ala Phe Gln Glu Tyr Ala Asn Ser Thr Glu Asp
325 330 335

Cys Ala Ala Ile Leu Phe Asp Asn Ser Ala Thr Asp Leu Asn Ile Glu
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Ala Val Asn Glu Asp Phe Asn Glu Leu Lys Glu Leu Thr Asp Gly Leu
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Lys Arg Leu Asn Met Ser Lys Val Ala Asn Ala Ile Phe Ser Pro Leu
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Ser Asn Val Ala Gly Thr Ser Arg Ile Ser Arg Gly Val Gly Met Asn
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490

495

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His Met Ile Gly Leu Tyr Asn Thr Lys Arg Ile Val Ile Phe Val Cys
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Cys Thr Thr Thr Ala Ile Val Leu Thr Ile Trp Ile Trp Lys Arg Phe
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Ile Lys Ala Lys Lys Glu Pro Ala Pro Pro Ser Phe Asp Lys Tyr Leu
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 Pro Val Leu Gly Ser Asn Ser Asp Pro Ser Glu Glu Tyr Asp Ser Phe
 20 25 30

cag caa aat gtt ttc act cat caa cca acc caa cta cac aaa tct cat 144
 Gln Gln Asn Val Phe Thr His Gln Pro Thr Gln Leu His Lys Ser His
 35 40 45

cac tac att aca cac cag aaa aaa acc agc caa cac atc gac gat tta 192
 His Tyr Ile Thr His Gln Lys Lys Thr Ser Gln His Ile Asp Asp Leu
 50 55 60

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caa tca gga ttg ata agc agt aga gca gac aaa aag aag cgg tct ggt Gln Ser Gly Leu Ile Ser Ser Arg Ala Asp Lys Lys Lys Arg Ser Gly 210		215	220	672	
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gct tgt atg tac ccg gat aag agc aag gag gat tca cac cta ttt tac Ala Cys Met Tyr Pro Asp Lys Ser Lys Glu Asp Ser His Leu Phe Tyr 420 425 430	1296
gga acc agc ggt ctt cac atg gac tgg cct gta gtt tgc cca gtt tac Gly Thr Ser Gly Leu His Met Asp Trp Pro Val Val Cys Pro Val Tyr 435 440 445	1344
cct att aga gat tcg att ttt gga tcc tac gac gac caa aag gac gaa Pro Ile Arg Asp Ser Ile Phe Gly Ser Tyr Asp Asp Gln Lys Asp Glu 450 455 460	1392
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gct tcg aat gtt aga ggt gat caa atc tgg agc aga cac act cca gac Ala Ser Asn Val Arg Gly Asp Gln Ile Trp Ser Arg His Thr Pro Asp 755 760 765	2304
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His Tyr Ile Thr His Gln Lys Lys Thr Ser Gln His Ile Asp Asp Leu
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Asn Phe Tyr Asn Gly Lys Phe Asn Gln Lys Ser Arg Ile Gly Pro Gly
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Lys Val Val Asn Asn Ser Arg Asn Leu Val Glu Gly Glu Thr Leu Ser
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Lys Asp Asp Asn Lys Thr Lys Ser Lys Ile Lys Ser Lys Thr Ala Ser
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Thr Ser Asn Arg Thr Pro Phe Glu Val Ser Leu Ile Gln Ser Asn Ser
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Ser Leu Ser Pro Ile His Asn Ser Ser Thr Gln Asn Ser Ser His His
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180 185 190

Arg Asn Asn Val Leu Asn Arg Thr Leu Gly Arg Phe Gly Ser Phe Leu
195 200 205

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Val Lys Tyr Cys Asp Gln Asp Ser Pro Asp Glu Gly Thr Ser Ser Leu			
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Val Pro Ser Cys Leu Ile Ile Ser Asn Gly His Tyr Ala Leu Thr Ser
565 570 575

Leu Ser Ser Pro Asn Glu Glu Asp Ala Ile Asn Tyr Pro Cys Asp Ile
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Val Gln Gly Lys Gly Phe Leu Lys Asn Pro Asn Gly Gly Lys Lys Asn
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Ala Gln Glu Pro Pro Lys Glu Pro Glu Pro Glu Glu Pro Lys Lys Glu
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Gly Ala Glu Asn Lys Pro Lys Glu Lys Gly Lys Ser Glu Lys Lys Asn
625 630 635 640

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675 680 685

Lys Lys Asn Arg Ile Tyr Leu Tyr Ile Ile Leu Ala Val Ser Leu Val
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705 710 715 720

His Leu Lys Lys His Asn Ser Gln Ile Tyr Glu Asp Asp Asn Val Asn
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Asn Tyr Tyr Asn Glu Asp Phe Asp Asp Glu Gln Asp Arg Asp Glu Tyr
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 Gly Ser Pro Lys Gly Lys Gln Cys Lys Gln Leu Asp Phe Ser Ile
 35 40 45

gtg gta gat gaa tct gct agt ata tcg gat gat caa tgg gag ggt cag 192
 Val Val Asp Glu Ser Ala Ser Ile Ser Asp Asp Gln Trp Glu Gly Gln
 50 55 60

atg att cca ttt ttg agg aat ttg att cat acc gtt gac ctt gac aac 240
 Met Ile Pro Phe Leu Arg Asn Leu Ile His Thr Val Asp Leu Asp Asn
 65 70 75 80

act gac ata cgt ctt tcg ctt acc act tac tca act cca act cgc cag 288
 Thr Asp Ile Arg Leu Ser Leu Thr Thr Tyr Ser Thr Pro Thr Arg Gln
 85 90 95

ata ttt acg ttt ttg gat gct gct gca agc agt acc agg ctc gca ctc 336
 Ile Phe Thr Phe Leu Asp Ala Ala Ala Ser Ser Thr Arg Leu Ala Leu
 100 105 110

acg aaa ctt gat tgg atg aac ggt acc aaa gct agg tat ggt atg acc 384
 Thr Lys Leu Asp Trp Met Asn Gly Thr Lys Ala Arg Tyr Gly Met Thr
 115 120 125

tac act ggc agg gct ctg aac tac gtt cgt aag gct ata cta cca tat Tyr Thr Gly Arg Ala Leu Asn Tyr Val Arg Lys Ala Ile Leu Pro Tyr 130 135 140	432
ggt cgc aag aat gta ccc aag gca ctg tta ctg atc act gat gga gta Gly Arg Lys Asn Val Pro Lys Ala Leu Leu Ile Thr Asp Gly Val 145 150 155 160	480
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gaa ggt gta aat gta atg gtt att ggt gtc ggt gat gta aat gtt gct Glu Gly Val Asn Val Met Val Ile Gly Val Gly Asp Val Asn Val Ala 180 185 190	576
gaa tgc cgt ggc ata gta gga tgt gat gga ata atg gat tgt cct atg Glu Cys Arg Gly Ile Val Gly Cys Asp Gly Ile Met Asp Cys Pro Met 195 200 205	624
ttc aag cag acc aac tgg aag gat atc atg ggc ctc ttt aac agt tta Phe Lys Gln Thr Asn Trp Lys Asp Ile Met Gly Leu Phe Asn Ser Leu 210 215 220	672
atg aag gag gta tgt gat att tta cct cag gac gct gtt tgt gag cct Met Lys Glu Val Cys Asp Ile Leu Pro Gln Asp Ala Val Cys Glu Pro 225 230 235 240	720
gta tgg gca gaa tgg tca tct tgt aac ggg gaa tgt ggc gtt cct ggt Val Trp Ala Glu Trp Ser Ser Cys Asn Gly Glu Cys Gly Val Pro Gly 245 250 255	768
aaa cga act cgt gct ctt ttg gac ctc cga atg att gaa aag ccc gta Lys Arg Thr Arg Ala Leu Leu Asp Leu Arg Met Ile Glu Lys Pro Val 260 265 270	816
aat ggc tcg aat gga caa ccg ggt aaa tca tgt gag gat cag aag atg Asn Gly Ser Asn Gly Gln Pro Gly Lys Ser Cys Glu Asp Gln Lys Met 275 280 285	864
aac ttc tta ccc caa tca gag aca tgc acc ata gaa tgc aat cat gag Asn Phe Leu Pro Gln Ser Glu Thr Cys Thr Ile Glu Cys Asn His Glu 290 295 300	912
cct gtg cca agc tcg ccg gaa cct gta tca gat gat atg gat cac cca Pro Val Pro Ser Ser Pro Glu Pro Val Ser Asp Asp Met Asp His Pro 305 310 315 320	960
gaa cca act cct gtt aca ccg gaa ggt gac atg gat aaa tct cat tcc Glu Pro Thr Pro Val Thr Pro Glu Gly Asp Met Asp Lys Ser His Ser 325 330 335	1008
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Ser Ser Pro Thr Asp Met Ser Ser Ser His Ser Asp Met Pro Ser Thr			
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cct act ggc atg tca tca agt cac agt gat atg cca tca agt cac agt		1200	
Pro Thr Gly Met Ser Ser Ser His Ser Asp Met Pro Ser Ser His Ser			
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Asp Met Pro Ser Ser His Ser Asp Met Ser Ser Ser Pro Thr Asp Met			
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Ser Ser Ser His Ala Asp Thr Arg Val Gly Asn Thr Asp Glu Glu His			
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Asn His Arg Lys Asp Met Asp Val Lys Phe Pro Glu Asn Met Asp Asp			
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acg ctt gaa atg cag cgc gaa gag gac cta aag aag gaa ttg atg ctc		1488	
Thr Leu Glu Met Gln Arg Glu Glu Asp Leu Lys Lys Glu Leu Met Leu			
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caa cat gaa ctg aag ctt cag gaa gaa aag gaa agg gca gct att tta		1536	
Gln His Glu Leu Lys Leu Gln Glu Lys Glu Arg Ala Ala Ile Leu			
500	505	510	
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Glu Asn Asn Thr Pro Tyr Gly Ser Ala Thr Ser Val Ser Gln Asp Gly			
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Glu Ser Pro Thr Gly Val Pro Gln Ser Ser Glu Thr Asp Ala Ile Arg			
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cac gag gtg tat gac gat cac ccc gag gaa tct gaa aac acc ggg att		1680	
His Glu Val Tyr Asp Asp His Pro Glu Glu Ser Glu Asn Thr Gly Ile			
545	550	555	560
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Asn Ala Asp Val Thr Glu Ser Glu Asp Tyr Glu Gly Glu Lys Gln Lys			
565	570	575	
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Asp Glu Ser Asn Glu Arg Ser Thr Ser Asn Thr Thr Lys Ile Ala Gly			
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ggt gct cta cta ggt ctt ctt ctc ctt ggt gcc ggt ggt gga tac gct		1824	
Gly Ala Leu Leu Gly Leu Leu Leu Leu Gly Ala Gly Gly Tyr Ala			
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Val Val Asp Glu Ser Ala Ser Ile Ser Asp Asp Gln Trp Glu Gly Gln 50 55 60			
Met Ile Pro Phe Leu Arg Asn Leu Ile His Thr Val Asp Leu Asp Asn 65 70 75 80			
Thr Asp Ile Arg Leu Ser Leu Thr Thr Tyr Ser Thr Pro Thr Arg Gln 85 90 95			
Ile Phe Thr Phe Leu Asp Ala Ala Ser Ser Thr Arg Leu Ala Leu 100 105 110			
Thr Lys Leu Asp Trp Met Asn Gly Thr Lys Ala Arg Tyr Gly Met Thr 115 120 125			
Tyr Thr Gly Arg Ala Leu Asn Tyr Val Arg Lys Ala Ile Leu Pro Tyr 130 135 140			
Gly Arg Lys Asn Val Pro Lys Ala Leu Leu Ile Thr Asp Gly Val 145 150 155 160			
Ser Ser Asp Gly Ser Tyr Thr Ala Gln Val Ala Ala Met Leu Arg Asp 165 170 175			

Glu Gly Val Asn Val Met Val Ile Gly Val Gly Asp Val Asn Val Ala
180 185 190

Glu Cys Arg Gly Ile Val Gly Cys Asp Gly Ile Met Asp Cys Pro Met
195 200 205

Phe Lys Gln Thr Asn Trp Lys Asp Ile Met Gly Leu Phe Asn Ser Leu
210 215 220

Met Lys Glu Val Cys Asp Ile Leu Pro Gln Asp Ala Val Cys Glu Pro
225 230 235 240

Val Trp Ala Glu Trp Ser Ser Cys Asn Gly Glu Cys Gly Val Pro Gly
245 250 255

Lys Arg Thr Arg Ala Leu Leu Asp Leu Arg Met Ile Glu Lys Pro Val
260 265 270

Asn Gly Ser Asn Gly Gln Pro Gly Lys Ser Cys Glu Asp Gln Lys Met
275 280 285

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290 295 300

Pro Val Pro Ser Ser Pro Glu Pro Val Ser Asp Asp Met Asp His Pro
305 310 315 320

Glu Pro Thr Pro Val Thr Pro Glu Gly Asp Met Asp Lys Ser His Ser
325 330 335

His Ser Ser Ile Pro Ser Thr Pro Asp Met Pro Ser Ser His Ser Asp
340 345 350

Met Ser Ser Ser Pro Thr Asp Met Ser Ser Ser Pro Thr Asp Met Ser
355 360 365

Ser Ser Pro Thr Asp Met Ser Ser Ser His Ser Asp Met Pro Ser Thr
370 375 380

Pro Thr Gly Met Ser Ser Ser His Ser Asp Met Pro Ser Ser His Ser
385 390 395 400

Asp Met Pro Ser Ser His Ser Asp Met Ser Ser Ser Pro Thr Asp Met
405 410 415

Ser Ser Ser His Ala Asp Thr Arg Val Gly Asn Thr Asp Glu Glu His
420 425 430

Asn His Arg Lys Asp Met Asp Val Lys Phe Pro Glu Asn Met Asp Asp
435 440 445

Ile Pro Val Glu Asp Asn Pro Ile Pro Thr Asp Pro Arg His Gly Val
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Glu Pro Ser Pro Ser Asp Val Ile Pro Glu Asp Asp Gln Leu Arg Arg
465 470 475 480

Thr Leu Glu Met Gln Arg Glu Glu Asp Leu Lys Lys Glu Leu Met Leu
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Gln His Glu Leu Lys Leu Gln Glu Lys Glu Arg Ala Ala Ile Leu
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Glu Asn Asn Thr Pro Tyr Gly Ser Ala Thr Ser Val Ser Gln Asp Gly
515 520 525

Glu Ser Pro Thr Gly Val Pro Gln Ser Ser Glu Thr Asp Ala Ile Arg
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His Glu Val Tyr Asp Asp His Pro Glu Glu Ser Glu Asn Thr Gly Ile
545 550 555 560

Asn Ala Asp Val Thr Glu Ser Glu Asp Tyr Glu Gly Glu Lys Gln Lys
565 570 575

Asp Glu Ser Asn Glu Arg Ser Thr Ser Asn Thr Thr Lys Ile Ala Gly
580 585 590

Gly Ala Leu Leu Gly Leu Leu Leu Leu Gly Ala Gly Gly Gly Tyr Ala
595 600 605

Met Tyr Lys Lys Asn Lys Thr Pro Thr Val Glu Thr Gly Ser Gly Asp
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 His Arg Glu Leu Asp Leu Thr Ile Leu Val Asp Glu Ser Ser Ser Ile
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tat att gaa gag tgg aac aaa ctc att cca ttt ctt aaa tca ctg gtg 144
 Tyr Ile Glu Glu Trp Asn Lys Leu Ile Pro Phe Leu Lys Ser Leu Val
 35 40 45

aga tca ata aat ata agt cca aat tat gtg cac ttg tca atg gtc acc 192
 Arg Ser Ile Asn Ile Ser Pro Asn Tyr Val His Leu Ser Met Val Thr
 50 55 60

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 Phe Ser Thr Ser Ile Arg Trp Leu Ile Ser Phe Leu Asp Pro Ala Ser
 65 70 75 80

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 Lys Asp Glu Gln Leu Ala Leu Ala Val Leu Asp Lys Leu Lys Asn Ser
 85 90 95

aag cct gtg ttt ggg tac aca ttc act gga cag gca ctt aac ttt att 336
 Lys Pro Val Phe Gly Tyr Thr Phe Thr Gly Gln Ala Leu Asn Phe Ile
 100 105 110

tct gag gct gtt tat atg ttt ggt gct agg cgt aac tct cca aag ggc 384
 Ser Glu Ala Val Tyr Met Phe Gly Ala Arg Arg Asn Ser Pro Lys Gly
 115 120 125

atc att atc atc acc gac gga tcc tct act cag aca aac gtt act tct 432
 Ile Ile Ile Ile Thr Asp Gly Ser Ser Thr Gln Thr Asn Val Thr Ser
 130 135 140

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 Gln Ala Ser Ala Leu Leu Arg Asp Ala Gly Val Thr Ile Leu Val Val
 145 150 155 160

gga gtt ggg aag gct aaa gaa agc gag tgt aga ggt ata gtt ggt tgt 528
 Gly Val Gly Lys Ala Lys Glu Ser Glu Cys Arg Gly Ile Val Gly Cys
 165 170 175

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 Ser Thr Lys Gly Glu Cys Pro Leu Phe Phe Met Thr Asn Trp Asp Glu
 180 185 190

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Pro Lys Asp Ala Val Cys Lys Pro Ile Trp Ser Asp Trp Ser Lys Cys			672
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Asp Ala Lys Cys Gly Ile Gly Thr Arg Tyr Gln Lys Leu Met Gly Val			720
225	230	235	240
act aca att tct gag cca act gtc gga acg aac ggc aag tcc ggg agg			
Thr Thr Ile Ser Glu Pro Thr Val Gly Thr Asn Gly Lys Ser Gly Arg			768
245	250	255	
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Thr Cys Glu Met Ile Tyr Glu Asn Val Glu Val Pro Lys Glu Glu Cys			816
260	265	270	
tcc gtt gag tct aag att gct gga gga gtg gct cta gca ctg tta atg			
Ser Val Glu Ser Lys Ile Ala Gly Gly Val Ala Leu Ala Leu Leu Met			864
275	280	285	
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Leu Ala Gly Gly Tyr Thr Tyr Lys Lys Tyr Gly Leu Ser			912
290	295	300	
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Arg Val Ser Glu Thr Thr Asn Leu Asp Glu Asp Phe Ala Asp Ser Ser			960
305	310	315	320
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Gly Asn Arg Gly Val Arg Glu Ser Val Gly Glu Ala Tyr Thr Val Thr			1008
325	330	335	
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Tyr Ile Glu Glu Trp Asn Lys Leu Ile Pro Phe Leu Lys Ser Leu Val			
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Arg Ser Ile Asn Ile Ser Pro Asn Tyr Val His Leu Ser Met Val Thr			
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Phe Ser Thr Ser Ile Arg Trp Leu Ile Ser Phe Leu Asp Pro Ala Ser
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Lys Asp Glu Gln Leu Ala Leu Ala Val Leu Asp Lys Leu Lys Asn Ser
85 90 95

Lys Pro Val Phe Gly Tyr Thr Phe Thr Gly Gln Ala Leu Asn Phe Ile
100 105 110

Ser Glu Ala Val Tyr Met Phe Gly Ala Arg Arg Asn Ser Pro Lys Gly
115 120 125

Ile Ile Ile Ile Thr Asp Gly Ser Ser Thr Gln Thr Asn Val Thr Ser
130 135 140

Gln Ala Ser Ala Leu Leu Arg Asp Ala Gly Val Thr Ile Leu Val Val
145 150 155 160

Gly Val Gly Lys Ala Lys Glu Ser Glu Cys Arg Gly Ile Val Gly Cys
165 170 175

Ser Thr Lys Gly Glu Cys Pro Leu Phe Phe Met Thr Asn Trp Asp Glu
180 185 190

Ile Ile Arg Lys Val Gly Glu Leu Met Ala Glu Val Cys Glu Thr Ile
195 200 205

Pro Lys Asp Ala Val Cys Lys Pro Ile Trp Ser Asp Trp Ser Lys Cys
210 215 220

Asp Ala Lys Cys Gly Ile Gly Thr Arg Tyr Gln Lys Leu Met Gly Val
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Thr Thr Ile Ser Glu Pro Thr Val Gly Thr Asn Gly Lys Ser Gly Arg
245 250 255

Thr Cys Glu Met Ile Tyr Glu Asn Val Glu Val Pro Lys Glu Glu Cys
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Ser Val Glu Ser Lys Ile Ala Gly Gly Val Ala Leu Ala Leu Leu Met
275 280 285

Leu Ala Gly Gly Gly Tyr Thr Tyr Tyr Lys Lys Tyr Gly Leu Ser
290 295 300

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gaa gaa ccg tta ggt tcg acg aaa gca tta acc aac ggg gag ttg aaa Glu Glu Pro Leu Gly Ser Thr Lys Ala Leu Thr Asn Gly Glu Leu Lys 110 115 120 125	926
aaa cta tcc gat aat att cct act aaa atg cct ttt gac att ggc gtt Lys Leu Ser Asp Asn Ile Pro Thr Lys Met Pro Phe Asp Ile Gly Val 130 135 140	974
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cct gat cac gaa aag ttc ctt gtt ggg aac acc att act gag ttg gat Pro Asp His Glu Lys Phe Leu Val Gly Asn Thr Ile Thr Glu Leu Asp 160 165 170	1070
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ggc cac gtc att gat cca tat tta gca tat gat gag gca ttt gat gcc Gly His Val Ile Asp Pro Tyr Leu Ala Tyr Asp Glu Ala Phe Asp Ala 190 195 200 205	1166
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Thr Ile Tyr Ser Arg Ser Tyr Val Asp Leu Ala Ile Gln Arg Leu Asn		
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gca aaa gat ttt aaa gag gta cta gat gag tca tct tac aga tca cgc		1646
Ala Lys Asp Phe Lys Glu Val Leu Asp Glu Ser Ser Tyr Arg Ser Arg		
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agt ttg caa tca gtg gag aaa cat aat gag caa caa aca ggt tct caa		1694
Ser Leu Gln Ser Val Glu Lys His Asn Glu Gln Gln Thr Gly Ser Gln		
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Val Pro Ser Ser Tyr Val Ala Glu Leu Gly Glu Ser Asp Thr Glu Thr		
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Cys Ala Val Ile Ala Gly Ala Tyr Leu Ser Leu Ser Gln Gln Glu Ser		
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Arg Gly Pro Arg Pro Thr Glu Asp Gln Ile Ser Gln Leu Pro Lys Asn
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Val Phe Phe Leu Leu Asp Asn Ser Ile Asp Met Ser Ile Glu Thr Gly
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Glu Glu Asn Arg His Phe Leu Ser Glu Phe Phe Lys Leu Leu Lys Lys
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Tyr Glu Gly Ile Asn Val Ser Leu Ile Arg Tyr Asn Ser Glu Glu Pro
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Leu Gly Ser Thr Lys Ala Leu Thr Asn Gly Glu Leu Lys Lys Leu Ser
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Asp Asn Ile Pro Thr Lys Met Pro Phe Asp Ile Gly Val Val Pro Thr
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Gly Ile Gly Ala Ala Leu Lys Gln Ile Lys Thr Leu Tyr Pro Asp His
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Ala Leu Gly Lys Asp Ile Val Val Ile Val Phe Thr Thr Gly His Val
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Ile Asp Pro Tyr Leu Ala Tyr Asp Glu Ala Phe Asp Ala Arg Arg Asn
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Gly Val Arg Phe Tyr Val Ile Asn Arg Gly Gly Lys Ala Lys Asn Tyr
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Trp Thr Gln Leu Leu Gly Cys His Tyr Asn Thr Cys Leu Ser Tyr Ile
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Arg Ala Lys Ile Thr Arg Pro Ser Leu Tyr Leu Asp Val Leu Val Asn
245 250 255

Arg Ile Val Ser Lys Arg Ala Lys Asp Ala Val Cys Leu Glu Val Trp
260 265 270

Thr Asp Tyr Lys Pro Asn Thr Glu Lys Ser Asp Val Arg Ile Met Thr
275 280 285

Ser Thr Leu Lys Leu Tyr Lys Thr Leu Leu Thr Gly Ser Phe Ala Glu
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Xaa Asn Ile Lys Gly Leu Thr Cys Asp Glu Gln Leu Lys Asp Met Gln
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Lys Arg Gln Ile Phe Cys Tyr Ser Asn Lys Cys Ala Pro Thr Ile Tyr
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Ser Arg Ser Tyr Val Asp Leu Ala Ile Gln Arg Leu Asn Ala Lys Asp
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Phe Lys Glu Val Leu Asp Glu Ser Ser Tyr Arg Ser Arg Ser Leu Gln
355 360 365

Ser Val Glu Lys His Asn Glu Gln Gln Thr Gly Ser Gln Glu Thr Leu
370 375 380

Ser Gly Ser Ala Arg Val Glu Thr Ser Leu Glu Ser Ser Val Pro Ser
385 390 395 400

Ser Tyr Val Ala Glu Leu Gly Glu Ser Asp Thr Glu Thr Tyr Lys Gln
405 410 415

Leu Glu Tyr Ile Asp Lys Asn Gly Val Thr Val Phe Asn Asp Glu Pro
420 425 430

Thr Val Val Val Asp Thr Pro Glu Tyr Val Gln Lys Val His Glu Arg

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Glu Met Gln Phe Asp Glu Glu Ser Thr His Leu Pro Asn Ser Gly Asn
450 455 460

His His Pro Pro His His Arg Lys Gly Ala Asn Gly Ser Gly Lys Lys
465 470 475 480

Thr Thr Ile Val Val Gly Ile Ile Cys Leu Val Val Ile Cys Ala Val
485 490 495

Ile Ala Gly Ala Tyr Leu Ser Leu Ser Gln Gln Glu Ser Val Glu Leu
500 505 510

Thr Ser Glu Glu Gly Asp Phe Leu Asn Asp Thr Thr Gly Gly Gln Pro
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Leu
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